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AIR POLLUTION IN GEORGIA... A COOPERATIVE STATEWIDE SURVEY

Rudolph P. Lewis, et al

Public Health Service
Cincinnati, Ohio

April 1962

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Georgia Department of Public Health
and
U. S. Department of Health, Education and Welfare
Public Health Service

AIR POLLUTION IN GEORGIA

A Cooperative Statewide Survey

Details of illustrations in
this document may be better
studied on microfiche.

PARTICIPATING STAFF

RUDOLPH P. LEWIS, Senior Industrial Hygienist
Industrial Hygiene Service
Georgia Department of Public Health
SAMUEL B. MCKEE, Assistant Sanitary Engineer
FRANK A. BELL, JR., Senior Sanitary Engineer
Division of Air Pollution
Public Health Service
U. S. Department of Health, Education and Welfare
HORACE S. CARTER, State Climatologist
Weather Bureau
U. S. Department of Commerce

U. S. Department of Health,
Education and Welfare
Public Health Service
4676 Columbia Parkway
Cincinnati 26, Ohio

State of Georgia
Department of Public Health
47 Trinity Avenue, S.W.
Atlanta 3, Georgia

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PREFACE

During recent years air pollution has come to the forefront nationally as a major problem of man's environment because of its nuisance, property damage and other effects, and because of its potential injury to health. In 1959 a survey of industrial air pollution in Georgia, carried out by the Georgia Department of Public Health, showed the existence of a number of significant air pollution problems due to emissions from industrial plants. Emission of air pollutants has been increasing in Georgia from a variety of sources including automotive vehicles, burning refuse dumps, home and commercial heating plants and other sources, in addition to industrial sources. These increased emissions have resulted in a mounting number of air pollution problems. Therefore, a Statewide survey was undertaken to provide a current assessment of air pollution in Georgia and to develop recommendations for necessary action.

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SUMMARY OF FINDINGS

1. Air pollution problems in Georgia are expected to get steadily worse unless preventive actions are taken. This is true because of the increasing pollution emissions associated with certain activities of a growing population at home, at work, and on the roads.

2. Localized air pollution problems in which a neighborhood is bothered by odors, dusts or chemical emissions occur frequently in the various regions of Georgia.

3. All 23 district health departments that replied to the survey questionnaire reported air pollution emissions from industries which cause some concern. Twenty-two out of 80 city officials replying also reported air pollutants due to industrial emissions.

4. Nineteen out of 23 district health departments responding and 21 out of 80 cities responding, indicated burning refuse dumps as a source of air pollution. This is the second most common and extensive air pollution problem in Georgia.

5. An air sampling study conducted in Atlanta in February 1961 revealed the occurrence of a mild level of photochemical air pollution similar in nature to the smog in Los Angeles.

6. Generalized community-wide air pollution of the non photochemical type arises from emissions of smoke, dust, odors and fumes in most of the major metropolitan areas of the State and in several of the smaller cities.

7. Suspended particulate pollution levels in Atlanta, Columbus, Augusta, and Savannah are not, on the average, of major concern. However, on some days, especially in Atlanta, concentrations are somewhat higher than desirable. In Macon, the average suspended particulate pollution level is somewhat in excess of desirable and on fairly frequent occasions is much higher. (These findings apply specifically only to the one area in each city where sampling was done. Other findings probably apply to other parts of these cities but no data are available to determine exactly. Data are not available for other cities.)

8. Current air pollution activities in Georgia, on the local level, are inadequate to cope with the problem. The City of Atlanta employs one engineer for the purpose of air pollution control, and the Fulton County Health Department utilizes its industrial hygiene staff in making occasional short-term air pollution studies and spot air analyses. The Chatham County Health Department in Savannah has one man assigned part-time to air pollution ac-

tivities. Augusta has an anti-smoke ordinance which is enforced by the city engineer as one of his several duties. Elsewhere in Georgia, local health departments answer nuisance complaints caused by air pollution, but lack personnel and equipment to deal effectively with many of the problems.

9. Resources (funds, personnel, etc.) available for air pollution activities by the State government are presently inadequate.

10. Present Georgia law does not provide for effective air pollution prevention. The Georgia Department of Public Health can investigate air pollution problems and render technical assistance to local agencies regarding air pollution problems under their general health powers. However, its authority to conduct other necessary activities in the air pollution field is limited. State law setting forth the general powers and duties of county and district health departments gives them authority to deal with air pollution only to a very limited extent.

11. There are several areas within the State where a number of jurisdictions (cities and counties) are affected by a common air pollution problem and a number of areas where neighboring States share a common air pollution problem with jurisdictions in Georgia. There has not been sufficient cooperative action to combat these problems.

12. Meteorological conditions in the valleys between the mountainous ridges of northwestern Georgia are, generally speaking, unfavorable for dispersion of pollution. In the Piedmont Plateau and Coastal Plains regions, dispersion conditions are relatively favorable. Compared with other States, northern Georgia experiences a high frequency of stagnating high pressure weather systems that are conducive to accumulation of pollutants.

RECOMMENDATIONS

1. Local air pollution activities need to be strengthened. It is felt that this can be done best by established agencies, with some additional enabling authority at the State level. Local health departments should engage in activities within their capabilities, with appropriate assistance from the State.

2. All of Georgia's metropolitan areas (Atlanta, Savannah, Augusta, Macon, Columbus and Albany), and certain counties and smaller cities which have air pollution problems should undertake air quality assessments from time to time. Certain of the larger cities should institute and maintain modest long-term air quality surveillance to trace the course of air pollution levels and

to provide data upon which to base decisions regarding present and possible future control activities.

3. Since all metropolitan areas in Georgia, except two (Savannah and Albany), involve more than one county, and three metropolitan areas (Augusta and Columbus, Georgia and Chattanooga, Tennessee) extend across State lines, the cities and counties involved and the State should consider development of governmental mechanisms for effecting cooperative air pollution prevention programs.

4. State level responsibility for preventing air pollution in Georgia should be designated by law to the Georgia Department of Public Health. The Department should be authorized to carry out an air pollution prevention program to include but not be limited to the following:

A. Conduct air pollution surveys, investigations and sampling studies pertaining to the nature, extent, sources and effects of air pollution in Georgia.

B. Provide technical assistance to city, county and other air pollution agencies in the study and control of air pollution.

C. Assist in the training of city and county air pollution personnel regarding the technology of air pollution.

D. Establish standards of ambient (outdoor) air quality for protecting the health and general welfare of the people and plant and animal life, and for preventing property damage, nuisances, irritation of human senses, and interference with visibility.

E. Establish standards for maximum allowable emissions from air pollution sources for the purpose of protecting the health and general welfare of the people and plant and animal life, and for preventing property damage, nuisances, irritation of human senses, and interference with visibility.

F. Enforce ambient air quality and emission standards in circumstances wherein such enforcement by city agencies or local health departments is not reasonable or practical.

G. Develop a means for ensuring that establishments constructed in the future will not create air pollution in excess of ambient air quality or emission standards.

H. Collect and disseminate information pertaining to air pollution.

I. Cooperate with the U. S. Public Health Service or other agencies and groups in joint air pollution activities or grant programs.

5. Adequate budget and technical manpower should be provided to the Georgia Department of Public Health for carrying out the above described program of air pollution.

6. Advisory committees to the Georgia Department of Public Health should be used from time to time to help guide the Department's air pollution program.

7. Industries in Georgia should re-assess their air pollution situation with a view toward more rigorous protection of the public health and welfare and should begin to bring about control where needed even before being requested to do so by governmental bodies.

8. The various municipalities and other responsible agencies should take steps to eliminate burning refuse dumps and to provide better means of refuse disposal such as the sanitary landfill or disposal in properly designed incinerators.

AIR POLLUTION PROBLEMS IN GEORGIA

General Aspects

Historically, Georgia has been primarily a rural and agricultural State but in recent years the population of cities has grown rapidly while the rural population has declined (Figure 1). The State's population has increased by 800,000 people since 1940 and is expected to continue to increase.[1,2] Most of the increase will occur in metropolitan areas. Activities of these additional people in heating their homes, driving their cars, and disposing of their refuse will result in increased emission of pollutants. Industrial and commercial activity will surely grow with the population, resulting in still more pollution. There is no doubt that air pollution problems in Georgia will get steadily worse unless preventive actions are taken.

Air pollution in Georgia arises from industrial plants, commercial establishments, home heating plants, burning refuse dumps, power generation stations, motor vehicles and agricultural operations. A source of pollution may cause a specific problem in its surrounding neighborhood, resulting in public concern and complaints. This is particularly true of larger sources of pollution. Such troublesome sources of pollution occur frequently in Georgia as indicated by reports of district health departments and city officials (Figure 2). Smaller pollution sources, such as

home heating plants and automobiles, do not attract public attention but nevertheless they do contribute to the over-all problem. In larger cities, the accumulation of pollutants from both small and large sources may result in a broad scale, generalized problem.

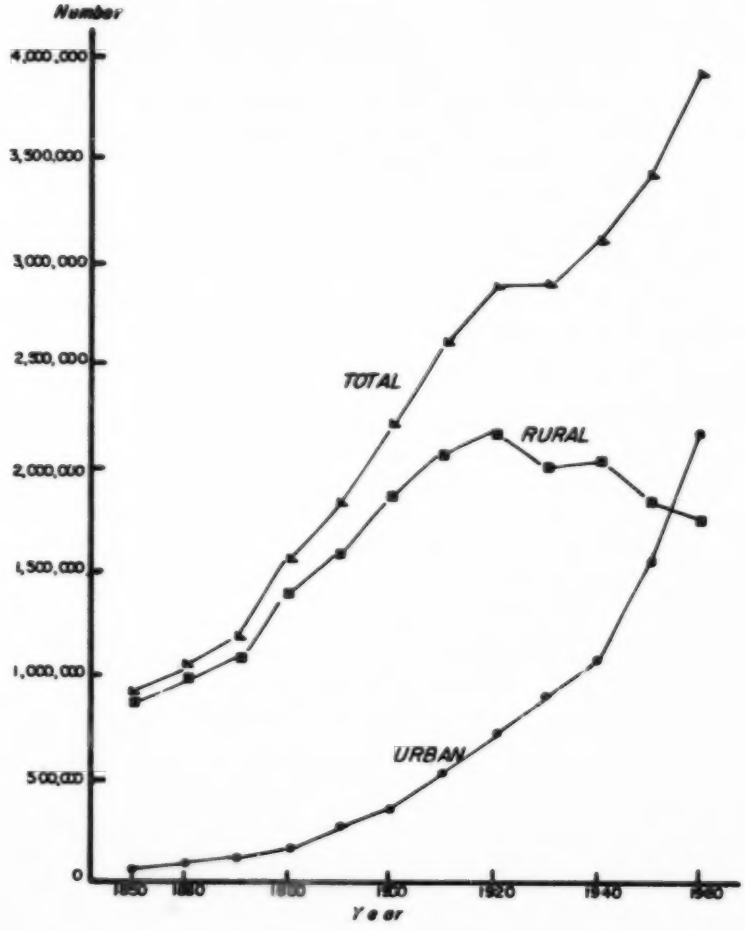


Figure 1. Population, Total, Rural, and Urban, Georgia, 1850-1960.

Undesirable effects of pollution which people notice include nuisances from odors, soiling of surfaces by dusts, eye irritation, and reduced visibility. Such effects were reported by many district health departments and city officials in Georgia in the current survey (Figure 3). The potential long-term effect of pollution on health and the more subtle effects of pollution on materials are not so noticeable.

Pollution From Use of Fuel

The quantities and types of fuels consumed for home heating, industrial, commercial, and other purposes have a great influence on the air pollution problem. In general, use of coal results in greater emission of black smoke and ash than does use of oil. Use of gas rarely causes smoke and does not result in emission of ash. Emission of sulfur dioxide is greater from use of coal and oil than it is from use of gas. Certain other gaseous pollutants are emitted when any of these fuels are burned. The trend of recent years away from use of coal and toward the greater use of natural gas has tended to reduce smoke, ash, and sulfur dioxide pollution levels. The greater overall usage of fuels which has accompanied

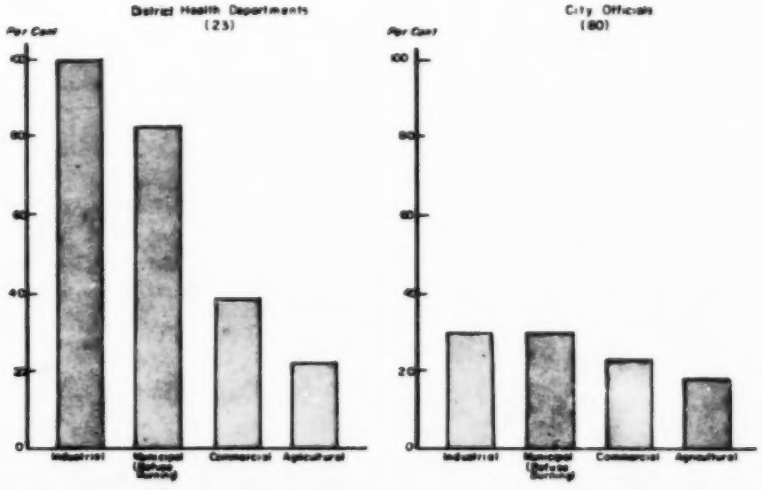


Figure 2. Sources of Air Pollution Reported by District Health Departments and City Officials, Georgia, 1961.

the growth of Georgia has tended to increase levels of certain gaseous pollutants. Natural gas, with 51.9 percent of the total, was the leading fuel used in 1958 (Figure 4). Manufacturing was the leading user of fuel, consuming 32.1 percent of the total. Domestic and commercial space heating, and steam electric power plants follow close behind (Figure 5).

Industrial Pollution

Air pollution from industrial operations occurs throughout the State and comes from many different kinds of plants. All of the district health departments reported occurrence of troublesome industrial pollution within their jurisdictions (Figure 2).

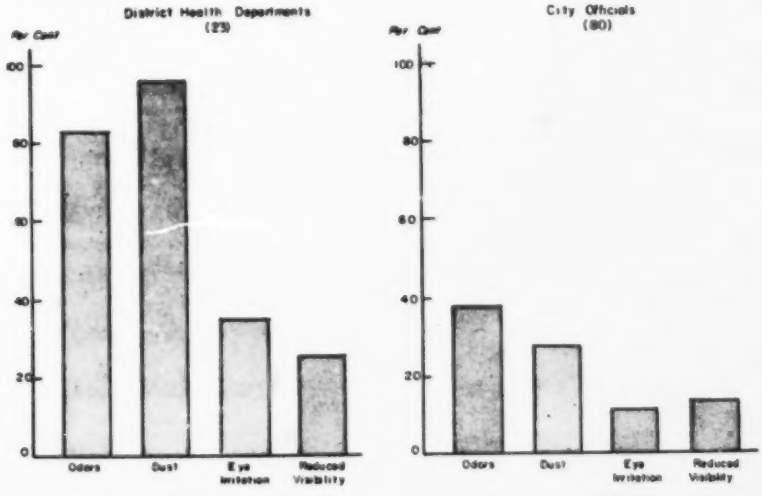
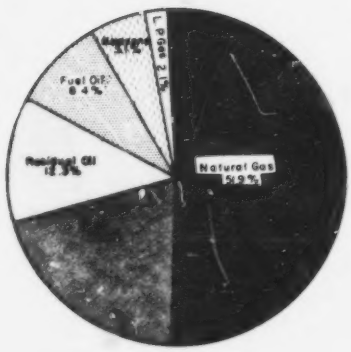
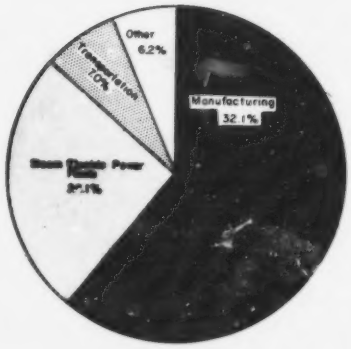


Figure 3. Air Pollution Effects Reported by District Health Departments and City Officials, Georgia, 1961.

The types of industrial pollution sources which are of concern are listed in Table I.

Chemical plants, including five insecticide plants, 20 fertilizer plants and others, give off a variety of obnoxious gases and particulate matter. Air pollutants from fertilizer plants can be irritating to the eyes and mucous membranes and can cause damage





Source: See references 7, 8, 9, 10 and 11, page 35

Figure 4.

Fuel Usage as Percent of Specified Fuels Used, Georgia, 1958.

Figure 5.

Fuel Usage as Percent Fuels Used for Specified Purposes, Georgia, 1958.

to vegetation. In some cases, cattle grazing on contaminated forage may be injured.

The dusty industrial plants of concern include 65 granite monument works and quarries, 19 plants processing kaolin, talc, slate,

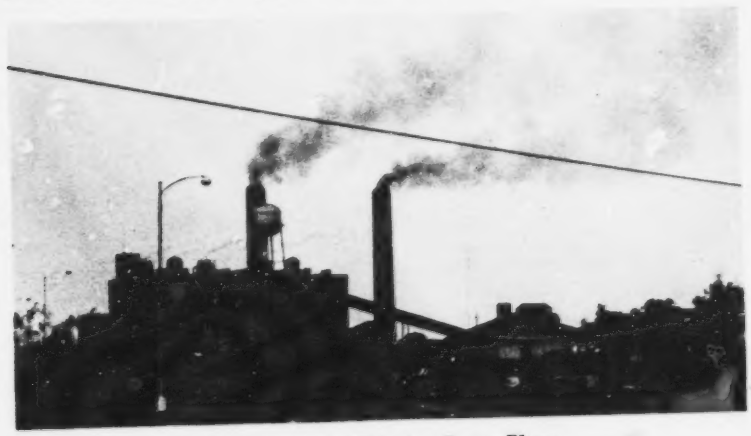


Figure 6. Coal Burning Power Plant.

and fuller's earth, 10 asphalt road mix batching plants, 6 rock crushing plants and quarries, and others. Asphalt road mix plants may emit obnoxious odors as well as dust.

Although Georgia does not have a large metals industry, important amounts of pollution can arise from this class of operation. Particularly annoying are the smoke and fumes arising from the open burning of old automobile bodies for salvage purposes. Auto burners with air pollution controls are available and one has

TABLE I

SUMMARY OF OBSERVED OR REPORTED INDUSTRIAL AIR POLLUTION SOURCES IN GEORGIA — 1961 (a)

I.	*Chemical Industries*		
	Fertilizer plants (Phosphate and others)	20	
	Insecticide plants	5	
	Oil refining and reclaiming plants	2	
	Asphalt oxidizer	1	
	Titanium oxide pigment plant	1	
	Other chemical plants	3	
			32
II.	*Dusty Industries*		
	Granite monument works and quarries	65	
	Kaolin, talc, slate, and fuller's earth	19	
	Asphalt road mix plants	10	
	Rock crushing plants and quarries	6	
	Cement plants	2	
	Fiber rug manufacturers	2	
	Barites processors	2	
	Gypsum plant	1	
	Lightweight aggregate plant	1	
	Silica brick works	1	
	Quartz and feldspar processor	1	
			110
III.	*Metals Industries*		
	Scrap metal reclaimers	3	
	Non-ferrous foundries	3	
	Ferrous foundries	2	
	Electric furnaces (steel)	1	
			9
IV.	*Food and Associated Industries*		
	Peanut mills	26	
	Meat packing and rendering plants	12	
	Feed mills	8	
	Tallow plants	2	
	Coffee roasters	1	
	Animal feed processor	1	
			50
V.	*Wood Industries*		
	Sawmills and planing mills	14	
	Pulp and paper mills	9	
	Plywood manufacturing plants	3	
	Wood products plants	3	
	Wood treating and preserving plants	2	
	Naval stores producers	2	
			33
VI.	*Others*		
	Cotton gins (approx.)	30	
	Brake relining shops	6	
	Laundries (smoke)	3	
	Composition roofing plant	1	
	Glass manufacturer	1	
	Feather pillow plant	1	
	Railroad shop (smoke)	1	
			43
TOTAL			277

(a) Troublesome sources of pollution reported on survey questionnaire, from Industrial Hygiene Service files, or observed by the survey group.

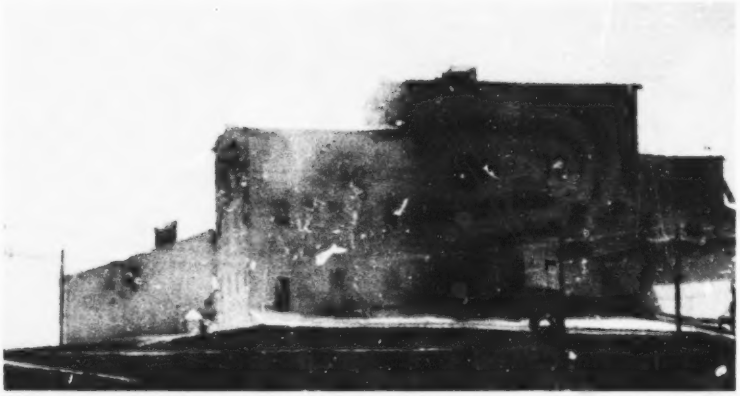


Figure 7. Fertilizer Plant Emits Fluorides and Other Pollutants.

Reproduced from best available copy.

been built and placed into operation in Georgia. A number of other types of auto body burning devices, with air pollution controls, are in operation elsewhere in the country.

Air pollution from food and associated industries frequently consists of dusts and obnoxious odors. Some of the most difficult problems arise from chicken rendering operations which are associated with Georgia's large broiler chicken industry.

Wood based industries in Georgia account for about one-half of the total number of the State's manufacturing establishments.

Figure 8. Dust from Granite Rock Crushing.

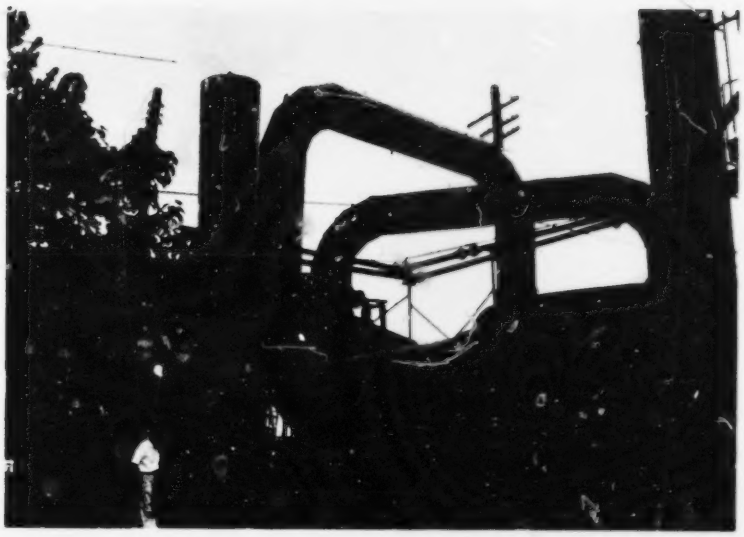


Figure 9. Air Pollution Controlled at Asphalt Road Mix Plant.

Over 2,000 sawmills, planing mills and furniture factories create about five millions tons of wood waste annually, most of which is disposed of by burning.[1] Georgia's large forested areas have made it one of the leading lumber and pulp and paper manufacturing

Figure 10. Auto Body Burner with Electrostatic Precipitator Off.

Auto Body Burner with Electrostatic Precipitator On.

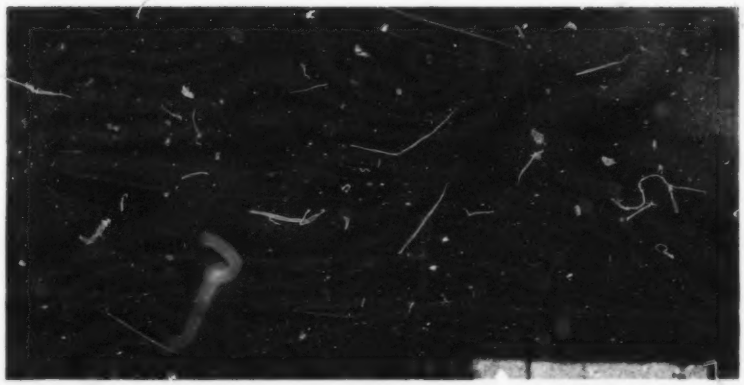


Figure 11. Industrial Boilers Burning Wood Waste May Emit Dense Smoke.

states.[5] Burning of wood waste frequently produces smoke and cinders which cause local air pollution nuisances. Pulp mills emit odorous substances which are objectionable for miles around a plant. Means for use or disposal of wood waste which do not create air pollution problems are available and, in some cases, are economically advantageous.

Although the textile and clothing industries are the largest employers, providing almost one-half of the State's manufactur-

Figure 12. Pulp Mills Add to Air Pollution.

ing jobs, their air pollution emissions tend to be minor. Sizeable amounts of dust arise from Georgia's cotton processing plants, principally gins and cotton reclaiming operations. A variety of other processes contribute to industrial air pollution in the State.

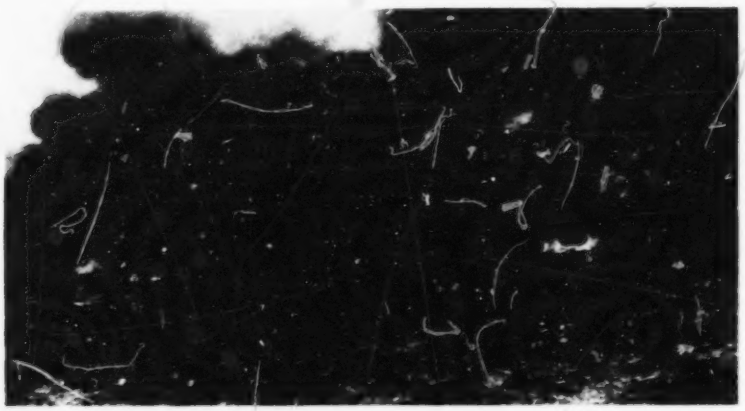


Figure 13. Burning Dumps are a Widespread Problem.

Air Pollution From Burning Dumps

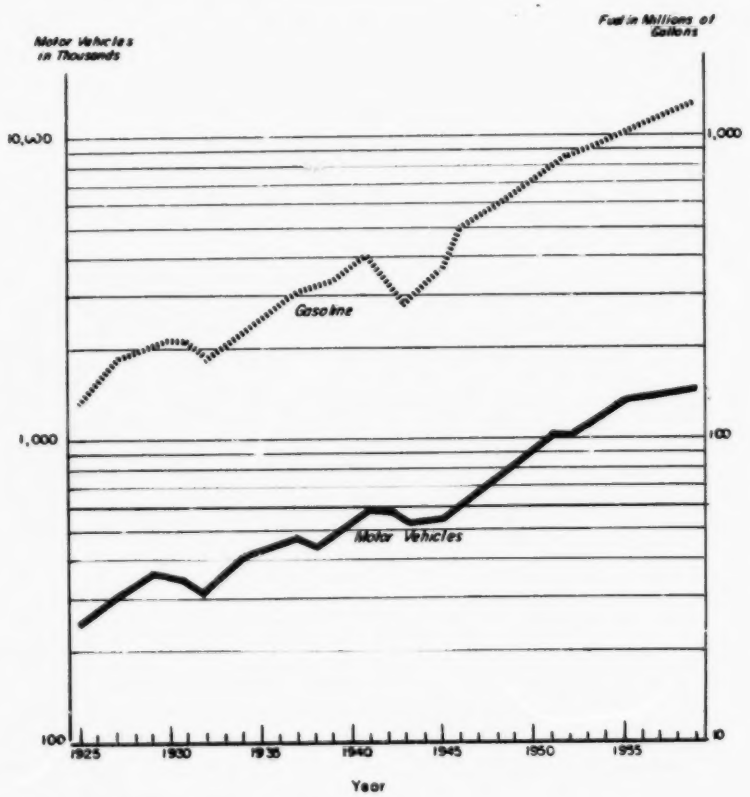
Over 80 percent of the district health departments responding in the questionnaire survey reported significant air pollution from burning municipal refuse dumps. Burning dumps emit smoke, fumes and odors and constitute eyesores as well as nuisances. Disposal of refuse by the sanitary landfill method or in properly designed incinerators are satisfactory replacements for open burning dumps.

Automotive Vehicle Pollution

Use and handling of automotive fuels are major sources of pollutants from which photochemical smog is formed. This type of smog was first found in Los Angeles, California. Photochemical smog is formed in the atmosphere by the reaction of hydrocarbons (unburned and partially burned gasoline vapors and others) and oxides of nitrogen under the influence of sunlight. The reaction results in pollutants which cause eye irritation, rubber cracking, plant damage, elevated oxidant concentrations in the air, and reduced visibility. This type of smog, at a mild level, has been detected in Atlanta. Large quantities of hydrocarbons arise from automotive exhaust pipes, crankcase vents, carburetors, and gaso-

line tanks, and from the handling and storage of gasoline at bulk storage depots and gasoline service stations. Oxides of nitrogen are emitted from automotive exhaust pipes, from most combustion operations, and from certain chemical processes.

There has been a steady increase in numbers of motor vehicles and in the consumption of gasoline (Figure 14). As the growth of cities continues, the problem of photochemical smog can be expected to become of more concern in a few of the larger metropolitan areas of Georgia.



Source: See references 3 and 12, page 35.

Figure 14. Amount of Gasoline Consumed and Number of Registered Motor Vehicles, Georgia, 1925-1959.

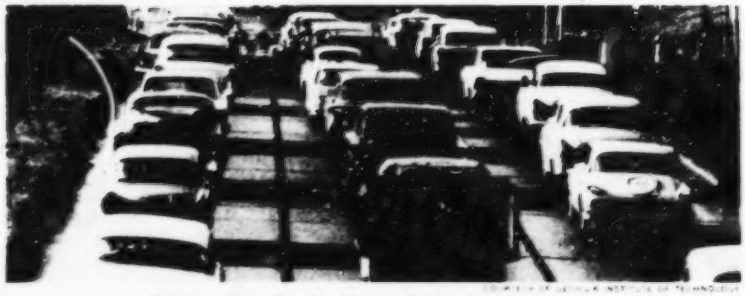


Figure 15. Traffic Brings Pollution to City Air.

Diesel powered trucks and buses emit odorous pollutants which may be irritating to the senses. They may also emit excessive black smoke. Better engine maintenance, proper operation, and proper fuels can be used to alleviate the smoke emission problem. However, since relatively little diesel fuel is used, emissions from diesel powered vehicles do not constitute a major part of the total pollution emissions in a community.

Figure 16. Diesel Engines Add Smoke to Air.

Radioactive Pollution

The largest source of radioactive pollution in the air has been nuclear detonations occurring outside of Georgia. However, within or near Georgia are one small atomic reactor, one small reactor under construction, and the large Savannah River nuclear project, in addition to numerous users of radioactive isotopes such as researchers, doctors, hospitals and others. Measurements of atmospheric radioactivity have not revealed any problems of concern to the public from the local sources. Existing continuous vigilance in monitoring and surveillance is being maintained to detect unexpected emissions of radioactive pollutants.

REGIONAL AND LOCAL PROBLEMS

Georgia may be divided topographically into four regions: the Blue Ridge; the Valley and Ridge; the Piedmont Plateau; and the Coastal Plains (Figure 17).

The Blue Ridge region is sparsely settled and contains no large city. The area does not have extensive air pollution problems although chicken rendering plants and a few other establishments cause some difficulty. However, industrialization is on the increase. Since most attractive industrial sites are in the valleys where conditions for dispersion of pollutants are less favorable, local air pollution problems could develop.

The Valley and Ridge region includes such cities as Rome, Cartersville and Dalton, and is beset with considerable air pollution problems. Part of Walker County, in this region, is in the Chattanooga metropolitan area. It is subjected to air pollution which drifts in from Tennessee from time to time.

The Piedmont Plateau includes the metropolitan areas of Atlanta, Columbus, Macon and Augusta, and thus includes a large portion of the metropolitan air pollution problems of the State. The Columbus and the Augusta metropolitan areas extend across State lines into Alabama and South Carolina, respectively. In these multijurisdictional areas, interstate cooperative action is needed to study the common air pollution problem and develop means of control which may be appropriate. The Atlanta metropolitan area includes Fulton, DeKalb, Cobb, Clayton, and Gwinnett counties. The Macon metropolitan area includes Bibb and Houston counties. These multijurisdictional areas demonstrate the need for cooperation among the cities and counties in an area in combating their common air pollution problem.

The Coastal Plains include the metropolitan areas of Savannah and Albany and a large portion of Georgia's forested lands. Six of the State's pulp mills and two large naval stores plants are located in this region. While community-wide air pollution is of some importance, the main air pollution problems are of a localized nature. Problems are due mainly to emissions from one or a few pollution sources which cause a nuisance primarily to their neighbors.

The type and severity of air pollution problems in the various counties are shown on figure 17. The figure is based on data from completed questionnaires obtained in the present survey and on

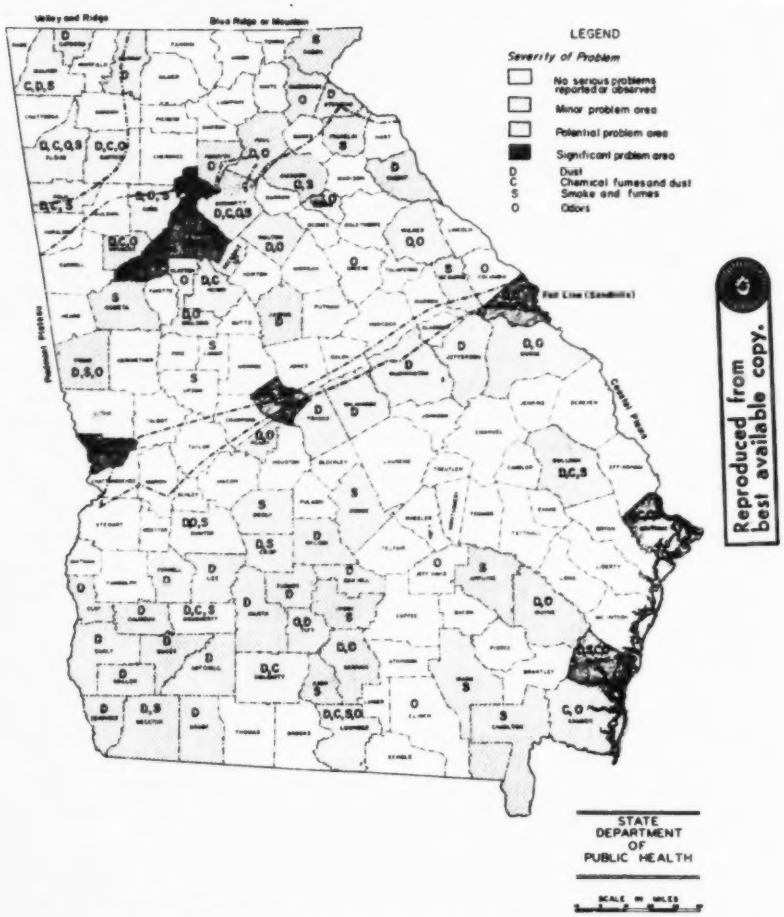


Figure 17. Counties with Known or Reported Air Pollution Problems, by Severity and Type of Problem, Georgia, July, 1961.

information from the files of the Georgia Department of Public Health. Seven counties are designated as significant problem areas – Fulton, DeKalb, Richmond, Bibb, Muscogee, Chatham and Glynn. An additional 15 counties are placed in the category of potential problem areas.

METEOROLOGICAL AND TOPOGRAPHICAL INFLUENCES ON DISPERSION OF POLLUTION

Meteorological patterns and topographical features of an area have an important effect on whether pollutants disperse quickly or slowly. The higher the wind speed, the more rapidly are pollutants carried away from their sources and diluted. Local topography often influences local wind directions and sometimes wind speeds. In valleys, wind speeds tend to be lower and the valley walls may confine pollutants emitted in the valley.

Atmospheric stability is an important factor in the dispersal of air pollutants. Stability is determined by the change in temperature with height. Normally the temperature decreases with height and, if this decrease is rapid, the air is unstable. Under these conditions pollutants are carried aloft and distributed through relatively deep layers of air so that high concentrations near the earth's surface are unlikely. When air temperature shows little or no decrease with height or when there is an actual increase with height (an inversion) the air is stable. Under these conditions vertical motions are restricted and pollutants are trapped in a shallow layer near the surface. High concentrations may develop if stable air and light winds persist for a considerable period of time. Hilly or mountainous terrain is a factor in the development and persistence of inversions. In general, in rugged terrain, valley inversions will occur more frequently and last longer than in areas with level terrain. Thus, conditions favoring accumulation of pollution occur more frequently in hilly or mountainous areas.

In late summer and autumn large, slowly moving high pressure systems often stagnate over Georgia and other southeastern states for several consecutive days. They cause stable conditions conducive to accumulation of pollution. The frequency of occurrence of stagnating high pressure systems over the eastern United States has been tabulated by Korshover[13] for a period of 21 years. He found that high pressure systems which stagnate for periods of four or more days occur most frequently in the southeastern United States with a large part of North Georgia lying in the area of greatest frequency. More than fifty stagnant situations influenced the northeast part of the State during the 21 year period considered and forty or more cases were experienced in all sections of Georgia. The highest frequency of stagnation cases occurred in Georgia during October, with May show-

ing the second highest number of occurrences. Since historical episodes, when acute illness and death were caused by air pollution, have been associated with stagnant high pressure systems, it is important to note that similar conditions occur rather frequently in Georgia. However, since other factors such as topography and the nature of pollution sources affect pollution levels, not all stagnant high pressure systems result in air pollution episodes.

Average wind speeds for various cities (Table II) indicate that Atlanta is a fairly windy city and, in general, will experience good dispersion of pollution. Augusta, Georgia and Chattanooga, Tennessee have low average wind speeds, a factor tending to hinder dispersion of pollution. For each location, the month of August had the lowest wind speed and the months of February and March included the highest mean wind speeds. However, low wind speeds occur in all areas on certain days. Therefore, high levels of pollution may occur from time to time at any location.

TABLE II

MEAN WIND SPEED FOR SELECTED LOCATIONS, BY MONTHS
(Miles per hour)

Month	Atlanta (1949-60)	Augusta (1951-60)	Macon (1949-60)	Savannah (1951-60)	Chattanooga (1941-60)
Jan.	12.0	6.9	9.3	9.2	7.2
Feb.	12.4	7.7	10.4	10.0	7.8
Mar.	12.2	8.1	10.4	9.4	8.0
Apr.	11.2	7.4	10.0	9.4	7.9
May	9.3	6.2	8.7	8.0	5.8
June	8.7	6.1	8.3	8.1	5.2
July	8.0	5.8	7.7	7.6	5.0
Aug.	7.3	5.4	7.0	7.5	4.1
Sept.	9.0	5.8	7.8	8.5	4.6
Oct.	9.2	5.5	7.5	8.3	4.8
Nov.	9.9	5.6	7.7	8.3	5.9
Dec.	10.9	6.1	8.3	8.8	6.3
Mean for period	9.6	6.4	8.5	8.5	6.3

The narrow valleys of the Blue Ridge region favor the accumulation of pollution. The Valley and Ridge region is composed of wide flat valleys separated by narrow steep ridges. Many of the valleys do not possess good air drainage characteristics, thereby posing a potential pollution threat. Topography of the Piedmont Plateau is mostly hilly or gently rolling and thus does not contribute to build-up of pollution levels. The Coastal Plains region is slightly rolling to level and therefore terrain does not restrict flow of pollutants.

AIR POLLUTION MEASUREMENTS

Previous Studies

Some air sampling has been carried out in the past to accomplish certain limited objectives. Over a period of fifteen years the Industrial Hygiene Service of the Georgia Department of Public Health has evaluated air pollution levels with regard to seven localized industrial air pollution problems. The Fulton and Bibb County Health Departments have made several air sampling studies of a localized nature.

The National Air Sampling Network of the U. S. Public Health Service gathers basic data regarding suspended particulate pollution levels nationwide. In Georgia, sampling has been carried out during various years in Atlanta, Augusta, Columbus, Macon, Savannah and at a non-urban site on Oatland Island (Chatham County)[6] (Table III). The data indicate that suspended particulate pollution in Atlanta, Columbus, Augusta, and Savannah are not of major concern, on the average, at the sampling station used. However, it is possible that suspended particulate levels in

TABLE III

SUSPENDED PARTICULATE MATTER IN GEORGIA AIR — 1959 and 1960[c]

(National Air Sampling Network)

City and Year	Number of samples	Average (Micrograms/ cubic meter)	Maximum (Micrograms/ cubic meter)
Atlanta, Ga., 1960	23	112	236
Jan.-June, 1961	13	92	194
Columbus, Ga., 1960	25	99	160
Macon, Ga., 1960	26	135	754
Augusta, Ga. Jan.-June, 1961	13	60	97
Savannah, Ga., Jan.-June, 1961	13	81	157

certain neighborhoods of these cities would be of concern. On some days, especially in Atlanta, concentration of suspended particulates is somewhat higher than is desirable. In Macon, the average suspended particulate pollution level is somewhat in excess of desirable and on fairly frequent occasions is much higher.

Pollen sampling has been carried out at various times since 1928 in Atlanta, St. Simons Island, Valdosta, Savannah, Colum-

bus, Decatur, Waycross and Moultrie. Significant quantities of ragweed, tree and other pollen were found in the air over Georgia during the various seasons for the different types of pollen. No known pollen studies have been made in Georgia since 1954.

Air Sampling Study in Atlanta

In order to begin the assessment of air pollution in Georgia and to provide further experience with air pollution sampling techniques to technical personnel, a short-term air pollution study was carried out in Atlanta, Georgia from February 16 to 22, 1961. The seven day sampling period included one week-end and one all-night sampling series. The sampling site was on the roof of the seventh floor level of the Georgia Department of Public Health building. Sampling was done daily from 8 a.m. to 5 p.m. Oxidants and visibility were measured each hour; nitrogen dioxide, nitric oxide and carbon monoxide were measured every two hours. Sulfur dioxide measurements were more irregular, but generally two samples were collected daily. Suspended particulate matter (solids) sampling was done continuously at both the State health department building and the Fulton County Health Department building. Information concerning the air pollution measurements and effects of pollutants are shown on Table IV.

TABLE IV

INFORMATION ABOUT AIR POLLUTANTS

Pollutant	Primary source of pollutant	Associated effects of pollution of most concern.
Oxidant	Photochemical Smog	Eye, nose, and throat irritation; visibility reduction; rubber cracking; plant damage; involved in photochemical smog.
Nitrogen Dioxide (NO_2)	Combustion processes including motor vehicles	Contributes to photochemical smog formation; toxic gas.
Nitric Oxide (NO)	Combustion processes including motor vehicles	Contributes to photochemical smog formation.
Carbon Monoxide (CO)	Motor vehicle exhaust	Toxic gas.
Sulfur Dioxide (SO_2)	Combustion of sulfur containing fuels	Plant damage; odorous; irritant, corrosive; toxic gas.
Particulates	Combustion processes; photochemical smog; other dusts	Soiling; visibility reduction; possible health effects.

The potential for air pollution in any area may be indicated by the maximum levels which occur and the frequency of occurrence of high pollution levels. The short-term study could give no indi-

Figure 18. Atlanta Smog. Feb. 16. 1961.

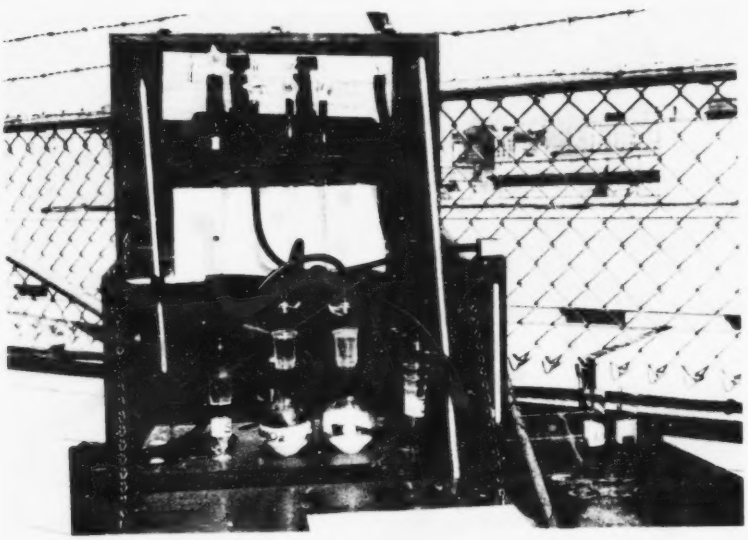


Figure 19. Gaseous Pollutant Sampling Apparatus Used in Atlanta.

cation of long-term frequency of occurrence of various pollution concentrations. Levels of pollution found are shown in Table V. The low levels of weight of total suspended particulate matter and soiling give a preliminary indication that Atlanta does not have a major smoke problem. The concentrations of nitrogen dioxide, nitric oxide, and oxidant indicate that photochemical smog, similar to that found in Los Angeles, occurs, at mild levels, in Atlanta. Automobiles are a major source of hydrocarbons involved in photochemical smog reactions. Automobiles and combustion operations of all kinds are major sources of nitrogen oxides which are involved in photochemical smog formation.

The maximum oxidant level of 0.14 ppm is three-fifths of 0.25 ppm, the concentration that causes eye irritation in some people. The low levels of sulfur dioxide found give a preliminary indication that pollution by this gas, due largely to use of coal and oil, is not of great concern. While moderate levels of pollution were encountered during this seven day period, higher levels undoubtedly occur at other times. Additional measurements are needed to better define the nature and extent of the problem.

TABLE V

MAXIMUM POLLUTION LEVELS — Atlanta, Georgia, Feb. 12-22, 1961

Pollutant	Maximum Measured	Date of occurrence
GEORGIA DEPARTMENT OF PUBLIC HEALTH BUILDING		
Gases		
Oxidant (a)	0.14 ppm	Thurs. Feb. 16
Nitric Oxide (NO) (b)	0.04 ppm	Thurs. Feb. 16
Nitrogen Dioxide (NO_2) (b)	0.15 ppm	Thurs. Feb. 16
Carbon Monoxide (CO) (c)	0.7 ppm	Thurs. Feb. 16
Sulfur Dioxide (SO_2) (d)	0.006 ppm	Fri. Feb. 17
Solids		
Soiling Index (e)	2.9 cohs per 1000 linear ft.	Thurs. Feb. 16
Total suspended particulates (f)	186 ug/cu.m.	Thurs. Feb. 16
Visibility (g)	2 mi. at 72% relative humidity	Thurs. Feb. 16
FULTON COUNTY HEALTH DEPARTMENT BUILDING		
Solids		
Total suspended particulates (f)	152 ug/cu.m.	Thurs. Feb. 16

(a) Phenolphthalin method of measurement.

(b) Saltzman method of measurement in a NO_2-$KMnO_4$-NO train.

(c) Adaptation of N.B.S. detector tube technique.

(d) Collection in 0.05N sodium hydroxide solution using bleached basic fuchsin dye as color indicator.

(e) AISI automatic smoke sampler, 2 hour sampling periods.

(f) High volume sampler, 24 hour sampling periods.

(g) Average visibility from sampling site to recognized visibility markers in 360° circle. Since no visibility of less than 3 miles occurred with a relative humidity of less than 70%, water vapor must be presumed to be a possible cause of reduced visibility and therefore, none of the reduced visibility observed can be considered significant from an air pollution standpoint.

GOVERNMENTAL AIR POLLUTION ACTIVITIES

City Air Pollution Activities

Georgia law has extended general authority to cities to provide for their own government and for regulation of activities within their jurisdictions. This includes authority to regulate air pollution.

Fifteen out of 80 city officials replying to the survey questionnaire stated that they had ordinances for the control of emissions of smoke, dust and fumes and 24 reported that leaf burning was restricted by ordinance. However, only two cities have specially designated personnel and procedures for the enforcement of regulations.

The City of Augusta has a smoke control ordinance which is administered by the City Engineer as one of his several duties. The City of Atlanta has an air pollution control program which is under the jurisdiction of the Building Inspection Department. The staff consists of one full-time air pollution control engineer who receives assistance from members of the Building Inspection Department which includes the Heating and Ventilating Section. The Atlanta program has as its primary purpose the control of individual industrial and commercial air pollution sources and has attained considerable success along this line. Plans for new or modified installations which may cause air pollution must have the approval of the air pollution control engineer.

County Air Pollution Activities

State laws setting forth the powers, duties, and authority of county governments do not deal specifically with the subject of air pollution. County and district health departments have been given various general authorities which enable them to deal with air pollution only to a very limited extent. No counties reported having an air pollution control activity as such, although the Fulton County Health Department does carry out occasional short-term atmospheric sampling studies and spot air analyses. One technical man has been assigned part-time to air pollution activities by the Chatham County Health Department. At various times other county and district health departments have participated to some degree in air pollution activities. Most of the State's population is served by county and district health departments which could, if given appropriate authority and funds, undertake air pollution control work. The need for such activity is clear.

State Department of Public Health Air Pollution Activities

Legislative authority extended to the State Department of Public Health to engage in air pollution work is limited. Many aspects of an appropriate program cannot be carried out under terms of existing laws. However, the Industrial Hygiene Service of the Department has rendered assistance to local agencies in the study of specific air pollution problems. Air pollution measurements have been carried out to define neighborhood problems in Atlanta, Columbus, Cordele, Elberton, Moultrie and Savannah. The majority of the air pollution problems that have been handled over the years by Industrial Hygiene Service personnel have been solved by the application of engineering principles to the control of air pollution at its source through cooperative action of those responsible for the pollution source.

In order to provide necessary leadership and assistance for local agencies and to conduct an air resource conservation program for the State, the Department of Public Health needs additional legislative authority, funds, personnel, and facilities. Since knowledge concerning effects and control of air pollution is limited, it may be desirable to arrange for advisory committees to assist the Department in evaluating problems and in arriving at plans for program activities. Such groups could be activated as needs arise and could be constituted of members with such qualifications as would be appropriate to the particular matter at hand.

Intercounty and Interstate Cooperation

Air pollution recognizes no political boundaries and may drift from county to county or from state to state. The metropolitan areas of Atlanta, Augusta, Macon and Columbus encompass more than one county, thus presenting problems of inter-county cooperation. The metropolitan areas of Columbus and Augusta and the Georgia part of the Chattanooga, Tennessee metropolitan area extend across the boundaries of States which adjoin Georgia. These interjurisdictional complexes point up the need for local governments and health departments and the State to develop cooperative metropolitan area-wide approaches to handling common air pollution problems within the State and also to the need for inter-state cooperation where air pollution problems extend across State lines.

At present there is no substantial activity directed toward the application of common resources to common air pollution problems of interjurisdictional metropolitan areas. Cooperative ef-

forts may be carried out through a variety of mechanisms including informal working arrangements between governmental agencies, the formation of interjurisdictional committees, and by the utilization of existing metropolitan regional groups for consideration of pertinent air pollution problems. If such rather informal mechanisms do not result in effective control of problems, it may become appropriate to consider State enabling legislation which would provide a framework for formal organizations designed to resolve interjurisdictional problem situations.

APPROACHES TO SOLUTION AND PREVENTION OF AIR POLLUTION PROBLEMS

Air Pollution Programs

The basic objective of air pollution programs is to preserve the public health and welfare. Others are to protect plant and animal life; prevent damage of property; provide visibility required for safe air and ground transportation; permit continued economic growth; and to maintain an aesthetically acceptable environment. Air pollution programs may be based on a variety of regulations and may consist of all sorts of program elements. The end result desired is to prevent emission of pollutants into the atmosphere or, in certain cases, prevent pollutants from reaching susceptible people, vegetation, animals, or materials, for instance, by use of tall stacks.

Elements which may be embodied in an air pollution program include the following:

1. Conduct pollutant emission inventories to determine where the pollution comes from.
2. Measure pollution in the ambient air to determine what the air pollution levels are and whether they are increasing or decreasing.
3. Detect violations of emission standards.
4. Arrange for alleviation of pollution sources which do not meet the standards.
5. Investigate public complaints of air pollution and secure abatement of problems, as appropriate.
6. Insure that new installations will be constructed in such a way that potential emissions will be appropriately controlled.
7. Disseminate information about air pollution.
8. Many others.

The nature and magnitude of governmental air pollution pro-

gram activities should be in keeping with the kind and severity of the problem to be solved. As with all governmental programs, there must be sufficient resources within the area served by a program to insure that funds necessary to conduct the program can be made available. It appears that there are about three district health departments with sufficient population to support a reasonably adequate, comprehensive air pollution program. Within each of these districts, there is one county that could, by itself, support such a program (DeKalb, Fulton, and Chatham). In other health districts and in other counties (largely served by county health departments) it is doubtful that sufficient funds would be justified for a complete air pollution program. However, these jurisdictions should be able to carry out certain of the less complex and less expensive aspects of a program. All of these local activities would be enhanced if the State Department of Public Health were in a position to extend technical assistance, to conduct or help conduct scientific investigations, to promulgate standards, and to engage in other activities directed toward conservation of the air resources of the State.

One of the best ways of insuring that pollution will not get worse in the future is to see that new establishments which might cause pollution are so designed and equipped that emission of pollutants will be minimized. This can be done by having a governmental agency review and approve plans for new establishments. Another way is to require those who are going to build new installations to register with a government agency. This gives the agency an opportunity to advise the builder of requirements he must meet and to find out what potential pollution sources are being erected. Such a function might be carried on by local agencies in the more populous areas and by the State in other areas.

Situations exist and will arise in which it is not reasonable or practical for local agencies to enforce ambient air quality or emission standards. These cases may be associated with lack of technical staff in the local agency; interjurisdictional flow of excessive pollution; or, strong influence of a local group which is opposed to an action which is necessary to the public interest. In such cases, it would be well to have a mechanism available which would authorize the State to take direct action to bring about abatement of excessive air pollution.

Planning and Zoning Aspects

Planning and zoning can serve three basic functions in the pre-

vention of air pollution problems, as follows:

1. Adequate separation of residences and industries to prevent local nuisance problems. Such separation can usually best be accomplished by a localization of the air polluting industries and by a mutual exclusion of industries from residential zones and residences from industrial zones.

2. Wise location of air polluting industries according to prevailing meteorological conditions to maximize atmospheric dispersion and to minimize the travel of air pollution to populous areas.

3. Control of the density of industrialization of an area can be useful in reducing the aerial density of air pollution emissions.

The installation of air pollution-free industries constitutes a zoning use similar to private residences insofar as air pollution emissions go. Utilization of the "industrial park" approach for industrial expansion provides a technique by which decentralization of non-polluting industries can proceed without deleterious effects upon atmospheric purity in localized areas.

As urbanization and industrialization proceed in Georgia, accompanied by a steadily increasing total population, the need for adequate planning and zoning will become more urgent. Of the 80 questionnaires returned by City officials (out of the 201 questionnaires mailed) 29 indicated they had zoning ordinances and 19 indicated that residences were restricted from industrially zoned areas. In the other 10, residences can be built in industrial areas, a situation which often leads to local air pollution problems. Increased attention should be given to planning and zoning as a tool for the prevention of air pollution problems. Liaison should be maintained between planning and zoning agencies and air pollution agencies.

Refuse and Solid Wastes Disposal

As one of the broad features of every community's life the disposal of refuse from homes, business establishments, industries, and of yard clippings, demolition wastes, etc., constitutes a problem in many ways. Some contend that open burning of wastes on dumps is necessary to keep costs down and to conserve land for future refuse disposal but such open burning results in many troublesome air pollution problems. Of 80 cities that replied to the survey questionnaire, 21 indicated that wastes were disposed of by open burning. A total of 25 reported the use of open dumps which, by their very nature, are subject to fires at any time. Most

of the health districts (19 out of 23 responding), reported air pollution problems arising from burning municipal dumps within their districts. From the survey it is evident that the open burning of refuse and other solid wastes is a widespread practice in the State. Where the burning of refuse creates local nuisances or contributes to a community-wide air pollution problem, efforts should be made to curtail the practice and to initiate disposal by the sanitary landfill technique or by use of properly designed incinerators.

Industrial Cooperation

Much progress in the control and reduction of air pollution can be realized through a forward looking and cooperative spirit on the part of industry. Industries in Georgia should re-assess their air pollution situation with a view toward more rigorous protection of the public welfare. They should begin to bring about control where needed even before requested to do so by governmental bodies.

Techniques and equipment for the control of air pollution are available in nearly all cases. It is much cheaper to provide for air pollution control in new plants as an integral part of the overall plant process equipment than it is to provide for such measures after a plant is built.

Use of Air Quality Data

Short-term studies of air quality, together with longer term surveillance can be used as a guide to the selection of needed air pollution control measures. This can be accomplished by comparing data from these studies with various criteria for the purity of ambient air. Long range trends are useful in deciding upon necessary air pollution actions. Results from the National Air Sampling Network furnish long-range trend data for suspended particulate matter levels in the cities of Atlanta, Savannah, Macon, Augusta and Columbus.[6]

All of Georgia's metropolitan areas (Atlanta, Savannah, Augusta, Macon, Columbus, Rome and Albany) and smaller cities which have air pollution problems should undertake air quality assessments from time to time. Certain of the larger metropolitan areas should institute and maintain modest long-term air quality surveillance programs to trace the course of air pollution levels. Data from such surveillance can then be used to make decisions regarding possible future control activities. An important func-

tion of the State's air pollution program should be to foster, promote, and support local air sampling activities.

EXISTING LAWS CONCERNING AIR POLLUTION

There are 15 cities in Georgia that have ordinances for control of emissions of smoke, dust and fumes. These were adopted under terms of general State enabling laws setting forth the power of city governments. Public health agencies, both State and local, have carried out some limited air pollution control activities under terms of laws setting out their general powers and duties or under the general laws relating to nuisances and their abatement. There is no State legislation at the present time specifically dealing with air pollution. Such legislation is needed to provide a legal basis for many activities which should be carried out by State and local agencies in the air pollution field. The idea that clean air is a right of man was expressed by the Supreme Court of Georgia in 1919, when the court said[14]:

> "Every person has the right to have air diffused over his premises, whether located in city or country, in its natural state and free from artificial impurities; by air in its natural state and free from artificial impurities is meant pure air consistent with locality and character of community." 149/345 (3) (100 S.E. 207).

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